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Magazine of Extension research & education | Fall-Winter 2014

What bees bring to the table

70% of our fruits and vegetables need pollinators

Helping horse owners | 4-H opens new doors | Innovative irrigation

UNIVERSITY OF MINNESOTA | EXTENSION

SOURCE

FALL-WINTER 2014

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CREDITS

Executive Editor: Aimee Viniard-Weideman
Managing Editor: Catherine Dehdashti
Production Editor: Sarah Bjorkman

Writers: Jonathan Eisenthal, Dan Gilchrist, Wendy Huckaby, Phoebe Larson, Tom Rothman, Allison Sandve, Aimee Viniard-Weideman

Designer: ECKES design

Photography: Sarah Bjorkman; Catherine Dehdashti; Jim Gehrz, Star Tribune/Minneapolis-St. Paul 2014; Jonathan Malat, KARE11; Steve Niedorf, Chris Polydoroff; Cory Ryan; Allison Sandve; Sarah Hayden Shaw; Josh Stamper; Scott Streble; Thinkstock.

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Photo contest winners: More than 200 Extension Facebook fans entered the "My flowers rock" photo contest to showcase Minnesota flowers and pollinators! (Top) First place: "My beautiful striped friend," by Christine Sand, Pine County. (Bottom) First place in pollinators: "Honey bees and chives," by Dawn M. LaPointe, St. Louis County.

See more entries: z.umn.edu/MyFlowersRock

Cover story: Bees bring a lot to the table, pollinating more than 70 percent of the fruits and vegetables we need to stay healthy. Honey bees, however, are in mass decline.

Turn to page 2 to learn how Extension connects research to education so everybody can be a part of the solution.

From the Dean

Generous donors extend the reach of Extension

Bev Durgan, Dean

Extension's impact is supported by our friends who generously give to ensure that we continue to make a difference in Minnesota and the world.

I am inspired by the many donors who are choosing to advance the education and research they are most passionate about — addressing issues in agriculture, leadership, youth development, gardening, communities, environment and families.

Earlier this year, KARE-11's Boyd Huppert featured a beautiful and moving story of one generous gift to Extension's 4-H program on his segment, "Land of 10,000 Stories." Curt Chergosky made an estate gift worth over $4 million to 4-H youth development in memory of his late fiancée, 4-H program coordinator Andrea Ruesch, who died suddenly in 2009 after blood clots formed in her lungs. The gift supports programs in southwestern Minnesota and statewide as well as post-secondary scholarships for youth in nine counties in southwest Minnesota.

If you have not already shed a tear over this story, please take a few minutes to watch *A Gift for the Ages* at: z.umn.edu/AGiftForTheAges

In May, there was yet another opportunity to celebrate a life well lived. The family of the late Mary Page, former University of Minnesota Regent, county commissioner and mayor, chose to honor her memory in a way that was as action-oriented as she was. They formed the Mary Page Community-University Partnerships Fund to support community-driven projects through Extension's Regional Sustainable Development Partnerships.

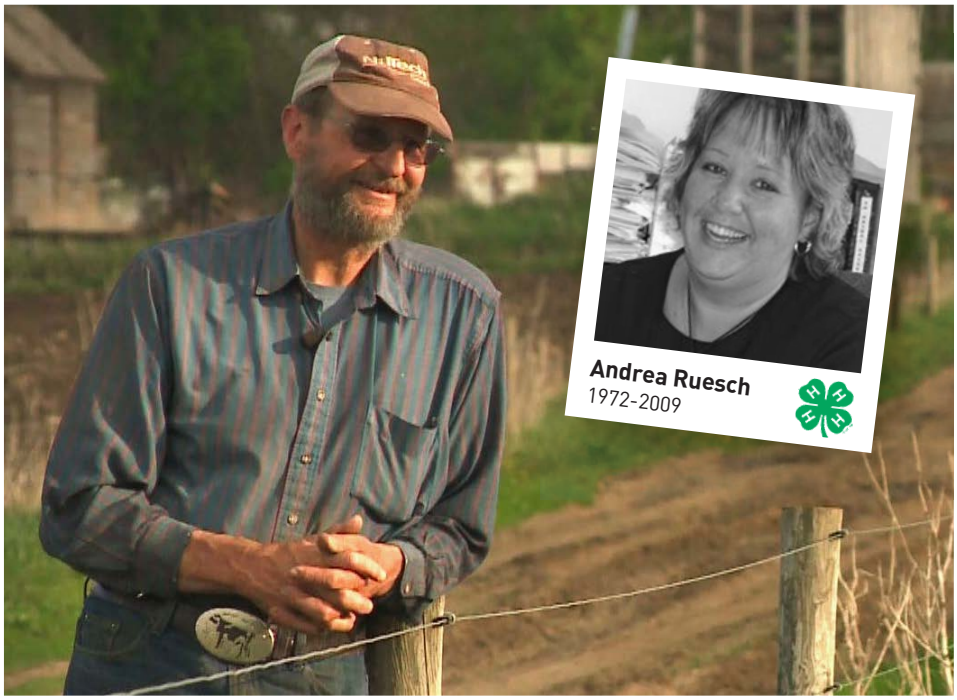
And this summer, during the heart of Minnesota's growing season, Pam Hartley, a longtime Extension Master Gardener, created a new endowment fund to support statewide Master Gardener education, as well as including this new fund in her estate planning.

These are just a few of the many ways Extension's friends are investing in the future of Minnesota through investments in Extension education and research.

You can learn more about supporting any of the existing funds, or creating a new one, by checking out our giving website (www.extension.umn.edu/donate) or talking with our development directors, Jane Johnson and Cara Miller.

Sincerely,

Beverly R. Durgan
Dean, University of Minnesota Extension



Lakefield-area farmer Curt Chergosky's planned gift to 4-H honors his late fiancée, Andrea Ruesch. The gift supports 4-H programs, scholarships and opportunities for youth to learn about agriculture-related jobs as the U.S. faces a shortage of agricultural scientists. Photo courtesy of KARE 11/Jonathan Malat

Pollinating new ideas

Extension brings new solutions to the problem of bee population decline

Marla Spivak, Extension entomologist, is driven to bring bees back through awareness and education.

It's what Marla Spivak calls a "big bee bummer." The Extension researcher and entomology professor lays out the facts: Honey bees and wild bees pollinate more than 70 percent of our fruits and vegetables. From a monetary standpoint, their value is estimated at $16 billion in U.S. farm income (insect pollinators in general account for $29 billion). Yet our bees are dying at alarming rates. Since 2007, an average of 30 percent of all U.S. colonies have died every winter due to disease, parasites, lack of plant diversity, pesticides and a flowerless landscape.

But Spivak, a 2010 MacArthur Genius Award recipient, hates to end on a low note. "We can turn it around," she says. "We need to raise awareness."

Since 2007, when alarms began to sound about the state of bees, Spivak's bee lab has come into the national spotlight. She and her students engage in research regarding bee health. It's complex, but Spivak's approach with citizens is simple and immediate. "Plant flowers," she says. "Flowers provide bees with critical nutrition—protein from pollen and carbohydrates from nectar."

Extension Master Gardeners disseminate information statewide about which native plants and flowers are best for bees and other pollinators. Anise hyssop, lupine and aster are go-to meals for bees, but researchers are beginning to study the concept of using cover crops such as alfalfa to attract pollinators as well. Farmers have used cover crops for hundreds of years to improve soil quality and decrease erosion. "Thomas Jefferson talked about the benefits of farming with cover crops," says Jill Sackett, Extension crops educator. "But we've never used them with the specific purpose of attracting pollinators."

That may change. Extension cover crop specialists like Scottie Wells are researching ways in which farmland can support both grazing animals and pollinators.

Wells recently launched a study of a series of cover crop mixes, which include species such as red clover, rye grass and buckwheat. "These crops could provide a floral nectar reserve from early spring to late fall," he says. "Such fields could serve as islands for pollinators."

Fruit and vegetable farms are also prime candidates to provide such sanctuary. John

Bees and other pollinators are in mass decline

Knisely, owner of Alternative Roots Farm, an apple orchard and community supported agriculture program in New Ulm, has seen the effects of incorporating cover crops such as white clover, alfalfa and buckwheat on his land. Knisely has noted the presence of six native bee species on the farm. "If we don't have pollinators, we don't have production," he says. "They are absolutely essential to our operation."

In urban areas, however, cover crops like clover have long been considered weeds. Sam Bauer, an Extension turfgrass educator, works to change that perception. "Most weeds are simply plants that people have deemed unacceptable," says Bauer. "For example, most households will not tolerate dandelions in their yards, but they're attractive to pollinators so we're trying to encourage people to accept some."

That said, Bauer and his colleagues understand that people take pride in their yards. "We don't encourage folks to allow every weed under the sun to grow freely," he says. "It is possible to strike a balance between aesthetics and ecology. The key is to plant species that grow at the same rate as the grass, such as white clover, so it appears less random."

Through research and education, Extension hopes to turn the "big bee bummer" into actions that encourage folks across landscapes to take up the cause. "We need to inspire a cultural shift," says Spivak. "The solution lies in simple acts and in everyone paying attention to the plight of our pollinators."

Apple orchards and other small farms can benefit from planting cover crops that attract pollinators. Pictured: John Knisely, owner, Alternative Roots Farm.

Extension Master Gardeners show youth that some of the same "Smart Snack" plants that feed bees keep people healthy too.

FEED THE CREW, TOO

"From country residents to condo dwellers, everyone can provide for pollinators," says Tim Kenny, Extension Master Gardener director and education director at the University of Minnesota Landscape Arboretum.

The Arboretum and Extension recently hosted a learning garden called "Smart Snacks." Master Gardeners were there to share information about how to create community gardens at schools, churches, libraries and other public places.

The Smart Snack garden concept includes healthy snacks for both people and pollinators—cherry tomatoes, basil, and an array of flowers such as zinnias and verbenas. Signs displayed nutrition information for the edible plants and carried reminders to "feed the crew," too.

"By 'crew' we mean bumblebees, the main pollinator of tomatoes," says Kenny. "Tomato plants pollinated by bumblebees produce 45 percent more fruit, so it's important to attract them to your garden with their own snacks—flowers."

Why it matters

- 71 percent of flowering plants depend on pollinators to reproduce
- Insect-pollinated plants grow more than 30 percent of our foods and beverages
- $29 billion in U.S. farm income is generated by pollinators

Why it's happening

- Flowerless landscapes that lack plant diversity
- Pesticides
- Disease and parasites

What you can do

- Plant bee-friendly plants
- Tolerate small amounts of "weeds" like clover and dandelions in your yard
- Reduce the use of pesticides

Learn more: www.extension.umn.edu/garden/honey-bees

Traveling to where the young people live and play is just one way 4-H attracts new, diverse audiences. (Left) Amelia Jackson, 4-H program coordinator, with kids at a Willmar housing site. (Right) Kathryn Sharpe, Extension youth development educator, with members of the Franklin Library 4-H Club in Minneapolis.

OPENING NEW DOORS

4-H reaches diverse communities of Minnesota's youth

Youth across Minnesota—from families who have been a part of Extension 4-H for generations to first-generation 4-H'ers—are engaging in 4-H in new and vibrant ways. Today, 4-H programs are as diverse as the interests of the youth they serve.

Krista Lautenschlager, 4-H program coordinator in Kandiyohi County, has witnessed Minnesota's changing demographics right in her own community. "I also noticed that many youth from the growing immigrant population didn't attend quality youth programs," she says.

That had to change.

"But you can't just take a program that's been working for one group of kids and expect it to work for all," she says. Lautenschlager found out that transportation was one barrier. Communication with parents was another. "Although 4-H has been a part of the fabric of our communities for more than 100 years, newer residents needed an introduction."

4-H on Wheels

That introduction took place in Kandiyohi County the way it does in many other communities: through partnerships. Then Lautenschlager and her colleagues tore down the transportation barrier by giving 4-H wheels.

> "Although 4-H has been a part of the fabric of our communities for more than 100 years, newer residents needed an introduction."

Today, "4-H on Wheels" serves Somali and Hispanic youth in Willmar on site at their housing developments. It's delivered with United Way and Willmar Community Education, and served 300 youth at six sites during the summer of 2014. Activities included camping, geocaching, healthy

living and more. The program is a Children, Youth and Families At Risk (CYFAR) project funded by the National Institute of Food and Agriculture.

"Summer learning loss affects kids' success in school and life," says Amelia Jackson, a Kandiyohi County program coordinator who focuses on science-based learning activities. "Making 4-H mobile gives harder-to-reach youth access to quality summer programs."

Summer also provides time to learn with a more playful mindset than during the school year. "Research confirms that play is essential in the education of young people, enhancing brain and body development," says Jennifer Skuza, assistant dean for Extension youth development. "This is one area where 4-H can help narrow the achievement gap. Informal learning motivates kids to explore their interests, develop skills and be more persistent in solving problems."

"4-H can help narrow the achievement gap."

This isn't just happening in Willmar, but in many places where new populations of youth have migrated as families have moved for jobs in agriculture, factories and other industries.

"Through this partnership with 4-H, we are able to help kids have fun and learn at the same time," says Tammy Rudningen, Willmar Community Education staff. "The college interns who help deliver the program also provide great role models and a connection to higher education for the kids."

4-H on Wheels enhances brain and body development for harder-to-reach youth during the summer months, when learning loss often occurs. This is one way 4-H can help narrow the achievement gap.

Changing lives

The Franklin Library 4-H Club in Minneapolis recently took their passion for their community and turned it into a video project to help neighbors connect and create a safer neighborhood.

The club is a partnership between 4-H in Hennepin County and the Franklin Community Library. Club members—primarily Somali and other East African youth from Minneapolis' Phillips and Seward neighborhoods—meet weekly at the library's teen center.

"It's a diverse group of kids in the heart of south Minneapolis," says Kathryn Sharpe, an Extension educator who guides the club. "They like serving their neighborhood, and they enjoy technology and science. The video project was one way they combined their interests for a great hands-on learning experience."

Habso Khalifa, a 17-year-old born in a Kenyan refugee camp, said 4-H has taught her about her community and about herself. "I used to feel angry about certain things and get in trouble," says Habso. "I think about my community now."

The video project helped Habso make that transition. "I learned that people have their moments," she told a Star Tribune reporter who covered the video screening. "That they have things that only they can do."

Research shows that youth programs like 4-H are more flexible than schools. They can better adapt to the needs of diverse youth populations, which are growing across Minnesota. "4-H is an important part of the University's outreach mission," says Dorothy Freeman, Extension youth development associate dean and state 4-H director. "The goal is to provide positive learning experiences to prepare all youth in Minnesota to succeed."

It's working for Habso, and she will pay it forward. "It's changed my life," she says. "4-H taught me how to be a role model. Now, the younger kids listen to me."

Youth in the Ka Joog 4-H program visited campus to engage in a science experiment guided by students of the University of Minnesota Center for Sustainable Polymers.

BRINGING STEM LEARNING TO SOMALI YOUTH

Education is regarded highly in the Somali-American community, and a new partnership is connecting Somali youth to Extension 4-H and the University.

Through funding provided by Youthprise! and CYFAR, 4-H Science, Technology, Engineering and Math (STEM) programs will be delivered at Ka Joog, a nonprofit on the West Bank in Minneapolis serving approximately 2,500 Somali youth annually.

In Somali, Ka Joog means 'resist' (literally, 'stay away') which symbolizes the goal to help Somali youth resist drugs, violence and other negative influences and help them stay on the path to higher education.

"Ka Joog began with a vision, a dream, and a lot of what-ifs," says Mohamed Farah, Ka Joog executive director and 4-H program coordinator. "Our partnership with Extension 4-H and the University is a perfect fit."

Beyond the pasture fence

Helping horse owners understand and manage costs

Extension equine specialist Krishona Martinson (right) examines the composition and quality of hay—two important factors horse owners must consider that directly relate to the cost of hay—with Kate Nelson, executive director of This Old Horse.

When you think of horse country, Minnesota probably isn't the first state that comes to mind. But surprisingly, the land of 10,000 lakes is also the land of 100,000 horses, putting Minnesota in the top 15 states nationwide for equine ownership.

Many people dream about having their own horse, but keeping a horse can be expensive. Costs for basic care amount to about $2,000 a year, which doesn't include property, boarding, training or trailers. And, that's when a horse is healthy. When the average horse owner has five to 10 horses, it's easy to see how costs can get out of hand.

As horse ownership grows, so does the need for education on horse health, nutrition, care and even pasture management.

"Feeding is among the most common and complicated issues horse owners face," says Krishona Martinson, University of Minnesota Extension equine specialist. "We've seen a doubling in hay costs in the last several years, at a time when many horse owners have felt the pinch of the economy."

Extension's research yields valuable answers about the most efficient way to feed horses, especially when droughts and flooding make hay scarce and expensive. For example, horses waste a lot of hay, but the type of hay feeder makes a big difference. Using a round-bale feeder resulted in as little as 6 percent hay waste, whereas not using a feeder resulted in up to 57 percent waste.

In 2011, Extension's equine program received a Morris Animal Foundation grant to research unwanted horse trends. They shared their results with the horse community, law enforcement and advocacy groups early in 2014. "The research identified areas of need for education," Martinson says. "This was done partly by mapping where horses were being resold more frequently.

"We educate people on what it costs to keep a horse when horses are healthy and when problems arise," says Martinson, who also conducts research into factors that lead to horse neglect and abandonment. According to her findings, when horses are not well cared for, their circumstances are most often linked to the cost of horse ownership, followed by the owner's knowledge, and the owner's physical and mental health.

THE PRICE OF NEGLECT

Since 2007, there has been a 400-percent increase in the number of unwanted horses in Minnesota, burdening both the public and nonprofit sectors.

Kanabec County Assistant Attorney Reese Frederickson, a veteran of horse neglect prosecutions, knows the neglect problem well. "The suffering is born by the animals, but the public pays the cost," Frederickson says.

When emaciated, ill or otherwise mistreated horses are seized from their owners, he explains, counties are legally responsible for seven to 10 days of their care. Besides feed and boarding, neglected animals typically require substantial veterinary attention. One case Frederickson recalls resulted in a $20,000 cost to Kanabec County.

One way to keep costs down for the public is to work with the nonprofit community dedicated to caring for rescued and rehabilitated horses. Extension's equine program works closely with these programs to help them maximize their ability to step in and nurture horses back to health.

"We've reached the point of being maxed out a lot over recent years," says Nancy Turner, president of This Old Horse, a sanctuary for retired, rescued and rehabilitated horses in Dakota County. "I turn to Extension for the research on how we can better manage our sanctuary, and for the educational resources to train the volunteers I depend on in order to keep going."

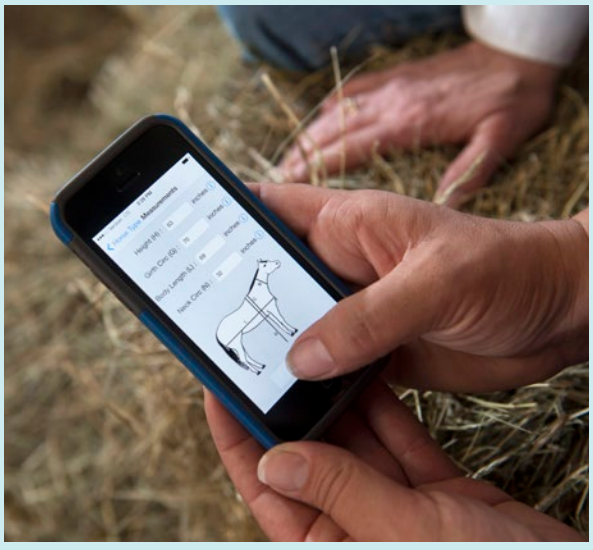
Costs quickly accumulate at This Old Horse, a nonprofit organization that provides lifelong sanctuary to horses. Nancy Turner, president, relies on Extension research to help her sanctuary operate efficiently. Pictured with Fiona, a rehabilitated horse.

Frederickson welcomes Extension's work to build awareness of the costs associated with horse ownership. "Prevention is important," he says. "If people know up front what a horse can cost, we can save the public from the financial burden so county law enforcement and courts can direct resources elsewhere."

Apps make horse care easier

Minnesota horse owners are enthusiastic participants in Extension field days and regional horse owner programs, but they're also tech-savvy. Krishona Martinson, equine specialist and program leader, says, "They're into social media, smart phones and video. And so are we."

In 2013, Extension released two applications for mobile devices. "Hay Price Calculator" and "Healthy Horse" help horse owners make cost and health decisions for their animals. They are the first apps offered for sale by the University of Minnesota. By summer's end, the equine program had sold more than 1,500 apps. It's just one of the ways Extension engages with participants to make sure they have access to research on the go and around the clock.



To learn more about the downloadable apps, visit www.extension.umn.edu/agriculture/horse/apps

Josh Stamper, Extension irrigation specialist, helps farmers reduce costs and conserve water by sampling soil water content to develop an irrigation schedule.

INNOVATIVE IRRIGATION

Smart tools increase precision in agriculture

Minnesota's agricultural crops contribute billions of dollars to our economy, but that depends on good yields. Annually, some 600,000 acres of the state's cropland use irrigation.

Potatoes are one example.

Paul Gray is a potato farmer in Clear Lake. "Potatoes have a shallow root system, and the soils they are grown in don't always hold water well," says Gray, executive secretary for the Minnesota Area II Potato Research & Promotion Council.

Extension has worked with farmers like Gray for nearly four decades to develop and fine-tune the tools that help them make the best management decisions for their crops while preventing runoff of excess nitrogen and other nutrients. "There are trade-offs and challenges, but our climate variations require well-managed irrigation to help grow affordable food," says Mark Seeley, Extension climatologist.

Jerry Wright, an Extension irrigation specialist who is now retired, helped develop the "checkbook method" of irrigation scheduling. Just as a checkbook register is used to balance deposits and withdrawals, the crop producer can use the tool to track soil moisture inputs and deficits. Such tools helped create the precision agriculture movement.

Josh Stamper, Extension's new irrigation specialist, is evolving the "checkbook" into the realm of high tech. The principles are the same as the "checkbook" balancing, but new technology brings more precision to decision-making, and more modern tools for the farmer. That's good for water quality in the land of 10,000 lakes—and downstream. "I'm using the latest weather data from weather stations that measure crop water use, to create irrigation scheduling programs that automatically update every time you open the program on your computer—or, eventually, on your smart phone," says Stamper. "This conserves water."

Other researchers in Extension and the University's College of Food, Agricultural and Natural Resource Sciences are discovering how to make the most of the precious resource. One innovation employs polymer coatings that allow fertilizer to diffuse slowly, and not get washed away by rain.

Alan Peterson, president of the Irrigators Association of Minnesota, has watched the technology change from traveling guns to water-conserving, low-pressure systems. "We're working with Extension now on soil moisture sensor research," he says. "It's a constant evolution toward greater efficiency."

Proper setup and calibration of a new irrigation system is an integral part of good water management.

The University of Minnesota is one of 12 universities named to the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force to help curb water pollution.

Prices rise when problems arise

Extension aids swine industry in stopping spread of disease

Grilling season got more expensive this past summer as livestock production dwindled. The nation's cattle herd has shrunk because of higher feed costs, and pork prices are up as the industry wrestles with a relatively new disease.

In Minnesota, PEDV (Porcine Epidemic Diarrhea Virus) is of particular concern. "Nationwide, nearly half of hog farms have been hit by PEDV, which first appeared in Minnesota in June of 2013," says David Preisler, executive director of the Minnesota Pork Board.

Jerry Shurson, Extension swine specialist, says it's important for consumers to understand that it's OK to eat pork. "All the pork in grocery stores and restaurants is perfectly safe," he says. "There's just less of it to eat."

The USDA has conditionally licensed the first PEDV vaccine on the market, but such solutions take time to make a difference.

Extension's successes with getting similar crises under control have always depended on timely recommendations, whether it's about nourishing animals during times of high feed prices or coping with animal health issues. "It helps that Extension can reach across the state with practical steps producers can use to make immediate changes," says Preisler.

When livestock viruses (like the current Porcine Epidemic Diarrhea Virus) drive up the cost of meat, Extension helps producers understand how to mitigate problems.

Sarah Schieck, Extension swine educator, has been working with producers, state officials, feed haulers and 4-H members to better understand how to help stop the spread of PEDV. "It's everyone's job in the industry to think about biosecurity," she says.

"There are already indications that pork production will turn around in the coming year," says Shurson. "We're hoping a comeback will make Minnesotan's summer barbeques more affordable in the next grilling season."

Helping Minnesota businesses discover energy-saving technology

Clean Energy Resource Teams (CERTs), a partnership of five organizations including Extension's Regional Sustainable Development Partnerships, is helping Minnesota's businesses discover new energy-saving technology.

Turkey growers are one interested audience. Minnesota is No. 1 in turkey production, and CERTs is encouraging hundreds of turkey growers to install LED lighting to lower costs and energy use. The campaign grew out of a pilot study on LEDs in turkey barns that indicated significant energy savings and rapid payback on investment.

"Obviously, anything we can do to save money while still producing a nutritious product is of interest," says John Zimmerman, former president of the Minnesota Turkey Growers Association. "More efficient lighting is a 'no-brainer.'"

But a "no-brainer" on paper does not yield immediate adoption. Questions arise about durability in moist, warm turkey barns and bulb life, and the implementation costs are also a factor. "We're educating farmers about utility rebates and federal financial assistance for LED upgrades, helping them determine their eligibility and projected cost-savings," says Joel Haskard, CERTs co-director.

"A lot of farmers think of energy as a fixed cost, but it doesn't have to be," says Haskard. "We want to help them reduce those costs and contribute to Minnesota's clean energy future."

CERTs has a similar campaign underway for service stations' canopy lighting, and in the past has worked with Minnesota resort and lodge owners to reduce their energy use.

Turkey farmers examine LED lights that are used to lower costs and energy use in turkey barns.

University of Minnesota
EXTENSION

Office of the Dean
240 Coffey Hall
1420 Eckles Avenue
St. Paul, MN 55108-6070

www.extension.umn.edu
TWITTER: @UMNEXT
FACEBOOK: UofMNExt
YOUTUBE: UofMNExt

Making sense of the 2014 farm bill

Minnesota's agricultural industry is the second-largest segment of the state's economy, generating over $75 billion in economic activity every year. The financial strength of our farmers is vital to Minnesota's economic health.

A key component of that strength is the 2014 farm bill. But first, farmers have to understand it. "The farm bill is a complex piece of legislation," says Kevin Klair, an Extension economist.

Because the 2014 bill expands the number of farm businesses eligible to participate, some will be new to the programs, and all will face new choices about how they will manage risk.

Extension is collaborating with the USDA's Farm Service Agency to deliver education on the farm bill to producers, landlords and agricultural professionals. The educational resources will include workshops, fact sheets and online tutorials.

"Extension has developed the tools producers need to decide which programs best fit their own business," says Deb Crusoe, Minnesota Farm Service Agency director. "Farm bill education is a big job and is important not only for farmers but for the entire state."

For 2014 farm bill and other agricultural business management information, visit www.extension.umn.edu/agriculture/business

Minnesota agriculture at a glance

- Creates 340,000 jobs
- State's second-largest industry
- Ranked fifth in nation for total production
- $75 billion/year in economic activity
- 79,800 farms

* Minnesota Department of Agriculture